



A particle P moves in a straight line. At time t seconds, where $t \geq 0$, the velocity of P is $v \text{ m s}^{-1}$. It is given that $v = -3t^2 + 24t + k$, where k is a positive constant.

The diagram shows the velocity-time graph for the motion of P .

P attains its maximum velocity at time T seconds. Given that the distance travelled by P between times $t = 1$ and $t = T$ is 297 m, determine the time when P is instantaneously at rest. [7]